SCOTTS PEAK DAM

Tasmania

Submission for an

HISTORIC ENGINEERING MARKER

from

The Engineering Heritage Committee
Tasmania Division
The Institution of Engineers, Australia

April 2000

SCOTTS PEAK DAM

CONTENTS

INTRODUCTION

Scotts Peak Dam is one of three dams impounding the headwaters of the Huon and Serpentine Rivers and forming a greatly enlarged Lake Pedder in southwest Tasmania.

The dam is the highest and longest of the three dams, being 43m high and 1067m in total length.

Water from Lake Pedder flows through McPartlans Pass Canal into Lake Gordon for power generation at the Gordon Power Station. Discharge from the station continues on down the Gordon River to Macquarie Harbour on Tasmania's west coast.

Proposals for flooding th natural Lake Pedder were foreshadowed by the Premier in 1965 and presented to Parliament in the Report on the Gordon River Power Development Stage 1 in 1967. Opposition to the flooding by conservation groups aroused considerable environmental debate.

The dam spanning the Huon River valley is a rockfill embankment with an upstream face of bituminous concrete as its waterproof membrane. There are only two bituminous concrete faced rockfill dams listed in the ANCOLD Register of Large Dams, 1990. These are Scotts Peak Dam and the smaller Mackenzie Dam in northwest Tasmania.

Commemorative Plaque Nomination Form

Date.....

To:

Commemorative Plaque Sub-Committee
The Institution of Engineers, Australia
Engineering House
11 National Circuit
BARTON ACT 2000

From…***Tasmania Division***
Nominating Body

The following work is nominated for an ***Historic Engineering Marker***

Name of work.....***SCOTTS PEAK DAM***

Location, including address and map grid reference if a fixed work.....***In south-west Tasmania, on the headwaters of the Huon River. Grid ref*: *E442500 N235400.***

Owner.....***Hydro-Electric Corporation***

The owner has been advised of the nomination of the work and has given approval ***Copy of letter attached***

Access to site.....***By road from Hobart via Maydena***

Future care and maintenance of the work.... ***Will be maintained by the Hydro-Electric Corporation as part of the Gordon River Power Development.***

Name of sponsor.....***Engineering Heritage Committee, Tasmania Division***

……
Chairperson of Nominating Committee

……
Chairperson of Division Heritage Committee

ADDITIONAL SUPPORTING INFORMATION

Name of work..... ***SCOTTS PEAK DAM***

Year of construction or manufacture…***Completed in 1973***

Period of operation.....***Continuous since 1973***

Physical condition .....***Very good***

Engineering Heritage Significance:

Technological/scientific value ..... ***Yes***

Historical value .....***Yes***

Social value .....***Yes***

Landscape or townscape value.....***Yes***

Rarity.....***Yes***

Representativeness .....***Not typical***

Contribution to the nation or region.....***Yes***

Contribution to engineering.....***Yes***

Persons associated with the work ..... ***Yes***

Integrity ..... ***Sound***

Authenticity.....***Complete***

Comparable works (a) in Australia.....***One***

(b) overseas.....***Many***

Statement of significance, its location in the supporting doco…***Page ??***

Citation (70 words is optimum)…..

Scotts Peak Dam, completed in 1973, diverts the flow in the upper Huon River to the Gordon Power Station for power generation. The rockfill dam has an upstream face of bituminous concrete, one of only two such dams in Australia. Its large storage (Lake Pedder) provides valuable security against power system failure during protracted dry periods. The campaign to save the original Lake Pedder from flooding remains a landmark in Australian conservation history. (73 words)

Attachments to submission (if any).....

Proposed location of plaque (if not a site).....

SCOTTS PEAK DAM

STATEMENT OF SIGNIFICANCE

GENERAL

Scotts Peak Dam has been nominated for listing on the Register of the National Estate. For that purpose a comprehensive Nomination was prepared in accordance with Australian Heritage Commission requirements. In that document the heritage significance of the dam was tested against nine National Estate criteria.

As one would expect, there is considerable overlap between the criteria for National Estate listing and the criteria for the award of an Historic Engineering Marker. Therefore the relevant pages of the Nomination are attached and there are frequent references to them in this Statement of Significance.

TECHNOLOGICAL/SCIENTIFIC VALUE

A high demand for new and enlarged water storages in Australia after World War 2 continued for several decades and dams were constructed in large numbers and to greater heights than ever before. Dam engineers looked for new designs and new methods to control the cost of these large structures.

Rockfill dams with an impervious membrane on the upstream face were seen as a simple and economical type and many were built, most with upstream membranes of reinforced concrete using normal Portland cement. However several high dams overseas had experienced spalling of the concrete face joints due to rockfill settlements, and quite large leakages developed which required repairs.

Another option was to use bituminous concrete for the upstream membrane. (Bituminous concrete consists of bitumen, filler, sand and coarse aggregates.) There was no precedent for this technology on dam faces in Australia. In 1967 two senior engineers from the Hydro-Electric Commission travelled overseas to discuss the design and construction of bituminous concrete faced rockfill dams with counterparts in the USA, Germany and France, and inspect dams proposed and under construction. They reported favourably on their findings for dams of moderate height (up to 60m).

The main advantages of bituminous concrete faces over reinforced concrete faces are

- the membrane can be much thinner (eg 120mm instead of 250mm)
- the material can be placed by standard hot-mix road paving machines
- there is no need for formwork or waterstops between adjoining runs
- the membrane can follow undulations in the face more closely, so that overthickness is reduced.

On the other hand, the stable upstream face slope is flatter for bituminous concrete so that a greater volume of rockfill is required.

Studies by the Hydro-Electric Commission in 1968 showed that two proposed rockfill dams would be cheaper with bituminous concrete faces than with cement concrete faces. One was the 14m high Mackenzie Dam completed in 1972 and the other was the 43 m high Scotts Peak Dam completed in 1973. The design of a bituminous concrete mix which was stable on a steep slope, and the associated laboratory and field testing, were carried out by the Civil Engineering Laboratories of the Hydro-Electric Commission.

Thus, together with Mackenzie Dam, Scotts Peak Dam marks the application of a dam technology new to Australia.

Scotts Peak Dam is also an example of an unexpected problem in dam performance, in that cracks developed in the face and leakage through the dam occurred in 1974, after Lake Pedder had filled. These events are described on page 8 of the Nomination under "Repair in 1975-76".

A novel method of sealing the cracks was required because they were 30 metres below lake level and the work had to be carried out without lowering the lake level. This work is also described on page 8 of the Nomination under "Repair in 1975-76". Additional information is provided on page 14 under "Criterion F1".

HISTORICAL VALUE

Scotts Peak Dam is an integral part of the flooding of the original Lake Pedder. Opposition to the flooding mobilised the formation of an organised conservation movement in Tasmania. The history of this controversy and subsequent developments are set out in the Nomination on pages 5 and 6, and on page 15 under "Criterion G1".

SOCIAL VALUE

The considerable social value of Lake Pedder is set out in the Nomination on page 14 under "Criterion E1".

LANDSCAPE VALUE

The exceptional landscape values of the dam and Lake Pedder are set out in the Nomination on page 12 under "Criterion A3".

RARITY

As stated earlier, Scotts Peak Dam is one of only two dams of this type in Australia.

REPRESENTATIVENESS

There are several features of the dam which are not typical of this dam type. These are the internal gravel zone, the cracks in the upstream face and the blanket of gravel which has sealed the cracks.

CONTRIBUTION TO REGION

The main contributions to the region arise from power generation and tourism. The Gordon River Power Development is a major component of Tasmania's power grid, and Lake Pedder contributes 40% of the flow through the power station. In addition Lake Pedder is a large lake which provides additional security against system failure in dry periods.

Tourism is addressed in the Nomination on page 14 under "Criterion E1.

CONTRIBUTION TO ENGINEERING

Engineering benefits from the sharing of both successes and failures within the profession. In the case of Scotts Peak Dam, the new bituminous concrete face technology, the leakage event and the method of repair were all shared with fellow dam practitioners through site inspections and papers given at conferences of the Australian National Committee on Large Dams and congresses of the International Commission on Large Dams.

PERSONS ASSOCIATED WITH THE WORK

The main people associated with the dam are listed in the Nomination on page 9 under "Prominent associated persons".

INTEGRITY

The dam is in sound physical condition and is well maintained by the Hydro-Electric Commission. Regular monitoring and inspections confirm that its performance normal and entirely satisfactory.

AUTHENTICITY

The design and construction of this dam had the benefit of previous experience and practice in the USA, France and Germany. However no two dams sites are identical, nor are dam designs the same in every detail. The design was carried out by the Hydro-Electric Commission's staff, and the dam was constructed by the Commission's work force with the exception of the bituminous concrete which was produced and placed by a contractor. The permanent repairs were also designed and built by the Commission.

COMPARABLE WORKS

(a) The only comparable work in Australia is Mackenzie Dam in northern Tasmania, also designed and constructed by the Hydro-Electric Commission.

(b) Many rockfill dams with bituminous concrete faces have been constructed overseas, as the following list of dams (over 60 metre high, up to 1971) shows:

Year	Country	Dam	Height
1954	Algeria	Iril Emda	75
1963	Norway	Venemo	64
1964	Italy	Zoccolo	66
1967	USA	Homestake	69
1969	Malaysia	Pedu	60
1969	West Germany	Grane	67
1969	France	Alesani	65
1970	West Germany	Obernaus	60
1971	Japan	Miyama	67

NOTE

The following pages from the Nomination for listing on the Register of the National Estate form part of this submission: pages 5, 6, 8, 9, 12, 14 and 15.

REFERENCES

1. BARNETT R H W "Surveillance of Large Dams in Tasmania", *I E Aust Annual Engineering Conference (Perth) Papers* April 1979 p.1-10.

2. COLE B A "Wave Wall Design for Scotts Peak Dam", *I E Aust Annual Engineering Conference (Townsville) Papers*, May 1976, p.126-133.

3. COLE B A and FONE P E J "Repair of Scotts Peak Dam, Tasmania", *Transactions 13th International Commission on Large Dams Congress (New Delhi)*, 1979, Q49 R15.

4. FITZPATRICK M D "Bituminous Concrete Membranes", *Australian National Committee on Large Dams Bulletin No 34*, Sept 1971, p.73-80.

5. FITZPATRICK M D and COLE B A "Scotts Peak Dam - Face Cracking and Repair", *Australian National Committee on Large Dams Bulletin No 46*, September 1976, p.9-15.

6. *Register of Large Dams in Australia*, Australian National Committee on Large Dams, Hobart, 1990.

major dam, storage and power station on the Gordon River, and the formation of an enlarged Lake Pedder to divert the waters of the Serpentine and Huon Rivers into Lake Gordon.

The proposed development was a continuation of the long term policy of the Tasmanian government and the Hydro-Electric Commission to utilise the natural and renewable hydro-electric resources of the State to produce the electrical energy needed for industry and the community. The submission reported on comparisons with alternative energy sources including conventional thermal power based on coal or natural gas, nuclear power generation, interconnection with Victoria and other hydro development options. Based on these studies it was concluded that the proposed development of the Gordon, Serpentine and Huon Rivers was clearly the most economic option and the recommendation was made that it proceed. The project was approved in 1967 and was completed in 1978.

Environmental debate

The submission to parliament included a recommendation for a much larger Scenic Reserve to encompass the new Lake Pedder. When conservationists opposing the scheme started to make themselves heard, a Legislative Council Select Committee took submissions from the public on the scheme, but the Government introduced legislation authorising expenditure on the development before the Committee could complete its hearings. The Committee approved the scheme in August 1967.

Community interest in seeing Lake Pedder grew, and the new Gordon River Road brought Lake Pedder within the reach (12 km) of many bush walkers who had previously considered the five-day return trip beyond their capabilities. A re-marked route from the sand pits near McPartlans Pass over the Sentinel Range became well used. (It was actually the northern section of Marsden's 1898 track from Port Davey). When the branch road to Scotts Peak reached the foot of Mt Anne, walkers could climb the peak in a day or walk to Lake Pedder along the side of Mt Solitary. Another route to Lake Pedder became available when the road reached Scotts Peak damsite in 1970.

In March 1972 a meeting of conservationists was held in the Hobart Town Hall to protest against the flooding of Lake Pedder. One of the key participants at this meeting was the late Dr Richard Jones who went on to form the United Tasmania Group, the first environmental political party.

Opposition to the scheme attracted considerable support in mainland centres, which resulted in the federal Lake Pedder Committee of Inquiry. In 1973 the federal government proposed a moratorium on the scheme and offered to pay the costs but this was flatly rejected by the Tasmanian premier. The Lake Pedder Committee's report was tabled in federal parliament in 1974. It analysed the environmental impact of the scheme and its implications on the process and management of developing major natural resources projects in Australia. The Federal Government then ratified the World Heritage Convention to give itself greater powers over the state governments.

With unwavering support from the Tasmanian government, the construction of the Gordon River Power Development Stage 1 proceeded as planned. The dams were all completed by 1974; the twin lakes of Gordon and Pedder filled by 1976 and the Gordon Power Station began producing electricity in 1977.

A small airstrip suitable for light aircraft was constructed near Edgar Dam to compensate for the loss of Pedder Beach as a landing area. The airstrip has had little if any use and the National Parks & Wildlife Service has recently decided that the area should be restored and revegetated.

Post-Pedder debates

A number of influential environmental groups formed as a consequence of the Lake Pedder debate. With time this resulted in significant changes in political alliances at all levels of government. The attitude to unrestricted development changed. Environmental restrictions were placed on a wide range of

development projects and/or industrial processes. Conservation zones were expanded considerably. Several important environmental campaigns were mounted to attract public attention to issues such as forestry practice, mining development, Daintree rain forest and Kakadu National Park. In the 1980s this led to one of the most significant debates on resource development in Australia, that is, the Lower Gordon Dam debate. The result of this debate was that federal legislation could override state legislation which contravened terms of foreign treaties such as the World Heritage Convention as ratified in 1974.

The Hydro-Electric Commission's report to parliament on the *Gordon River Power Development Stage 2* in 1981 presented several alternatives and recommended the building of the Gordon-below-Franklin Scheme. The Tasmanian Wilderness Society led by Dr Bob Brown ran a vigorous NO DAMS campaign, wanting to prevent further roads into the South-West in order to conserve the region; the Society particularly opposed the Lower Gordon Dam because its reservoir would make the lower third of the Franklin River unsuitable for rafting (the "Last Wild River" slogan). The State Labour Government favoured the Gordon-above-Olga Scheme which would have left the Franklin River untouched, but the lower house failed to convince the Legislative Council and later lost the May 1982 election. The incoming Liberal Government gained parliamentary approval for its preferred Gordon-below-Franklin Scheme within a month of the election. The Wilderness Society immediately switched its campaign to the federal sphere.

Work on the Lower Gordon Dam was in progress when the federal election took place in March 1983. The flooding of the lower reaches of the Franklin River by the Lower Gordon Dam was one of the main election issues that contributed to a change in government. The new Federal Labor Government passed legislation to stop the dam. The Tasmanian government mounted a case opposing the legislation in the High Court which upheld, with a four-three majority, the federal legislation. The Lower Gordon Dam case is seen as a significant change in the balance of power between the federal government and the states.

In 1994 a campaign was started with the aim of draining the Lake Pedder storage so that the original Lake Pedder could be reclaimed. The action attracted considerable debate, both in the state and on the mainland, and the federal government decided that the issue should be investigated by the Standing Committee on Environment, Recreation and the Arts (House of Representatives). The Committee's inquiry received 140 submissions in February and March 1995 and its report was published in June 1995. The report concluded in part that the flooding of the original Lake Pedder was regarded by many to be a mistake that should not have happened. However, it also found that significant costs would be incurred in draining the present lake and that such costs could not be justified.

A considerable number of articles, papers and books have been published on a wide range of issues associated with the Gordon River Power Development Stage 1.

2.3 Historical biographies

People associated with the history of the area include:

- *James Sprent* who arrived in Hobart in 1830 aged 22 was a school teacher with an interest in astronomy. He began survey duties in the colony in 1833, his work being directed to the triangulation of Tasmania. He erected and observed 206 trig stations in the period 1833 to 1847. He was appointed Surveyor General in 1858, retired the same year through ill health and died at New Town, Hobart in 1865. His son *Charles Percy Sprent* also became Surveyor-General and *Mt Sprent* (near Serpentine Dam) is named in his honour.

- *James Erskine Calder* who arrived in Van Diemens Land in June 1829 and was appointed assistant surveyor and made historic survey trips to the South-West in 1835 and 1837. During the latter trip he discovered and named *Mt Anne* (after the wife of Surveyor General Frankland), *Boyd River* (after Edward Boyd who became Surveyor General in 1839), *Mt Wedge* (after his colleague, assistant surveyor J H Wedge), *Wedge River* and *Serpentine River*. Perhaps surprisingly there is no topographical feature in the South-West named after Calder. After a long and distinguished career Calder died at his New Town home in Hobart in February 1882.

- *John Helder Wedge* discovered *Lake Pedder* in 1835 and named it after Sir John Lewes Pedder who was Chief Justice of the Supreme Court in Van Diemens Land at the time.

- British geologist *Charles Gould*, who was engaged to make a geological survey of Tasmania in 1859, roamed the whole area of the South-West and knew it intimately. He started the route from the Gordon River to a gap in the Frankland Range, then north east to the Thumbs and on to Hamilton. Gould left Tasmania in 1872 and died in Uruguay in 1893.

- *Adolphus Ibsen*, an assistant of Charles Gould, was commissioned by him about 1860 to begin a track from Goulds Landing on the Gordon River south through the Wilmot Range, north east to the Gordon Bend and the end of the Dawson Road which joined up with the road from New Norfolk to Hamilton. This was probably the most important early track cut in the South-West. It became known as Goulds post track to Hamilton and was the only overland access to the mining and pining settlements at Macquarie Harbour. The postman, *Francis McPartlan* (see below), made the trip out and back once a month taking 4 to 5 days each way.

- *Francis McPartlan* (1828-1888) was an Irish rebel transported to Hobart in 1847 and assigned to Sprent's survey party. This was his introduction to the South-West and his exploits in this region made him the doyen of the Tasmanian bushmen. He was postman, policeman, prospector, piner, survey assistant, track cutter and bushman extraordinaire. His South Gordon Track of 1882 started at Fitzgerald, traversed the plains and McPartlan Pass to the Gordon River.

- *James Reid Scott*, MLC. In 1881 Surveyor David Jones named a peak which he could see from the Frankland Range after James Scott. (It is uncertain whether the hill known as *Scotts Peak*, now an island in Lake Pedder, is the one actually chosen by Jones.) Scott made two visits to the pining areas at Port Davey, one in 1871 via McKays Track, and again in 1875 by boat when he was taken by some piners up the Davey River.

- *Thomas Frodsham* was another government surveyor after whom Frodshams Pass was named.

2.4 Technical description

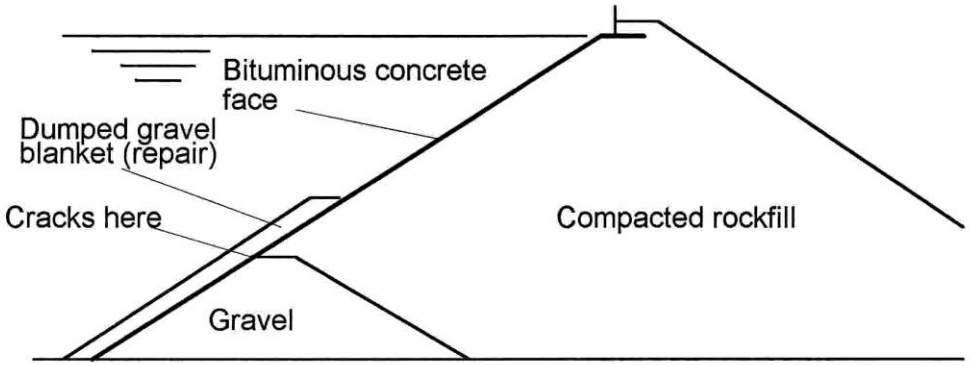
General

Scotts Peak Dam is a 43 m high rockfill embankment which spans the Huon River valley and two adjacent saddles, and has a total length of 1067 m. The embankment has an upstream face of bituminous concrete as its waterproof membrane. See the dam cross section below and Attachment D. The 115mm thick membrane is joined to the foundation by a concrete plinth. Inside the embankment adjacent to the plinth there is a zone of impervious gravel which reduces seepage through the foundations under the plinth. The remainder of the embankment is compacted argillite rockfill won from a quarry at nearby Red Knoll. The upstream and downstream face slopes are 1 on 1.7 and 1 on 1.3 respectively. On the dam crest there is a 4 m high wave wall.

The dam was designed and constructed by the Hydro-Electric Commission, except for the bituminous face which was placed by a contractor.

The reservoir created by Scotts Peak Dam and two other dams is named Lake Pedder. At its Full Supply Level (FSL 308.5m) the lake has a surface area of 241 sq km and a volume of 2 960 000 megalitres. Water from the lake flows through McPartlans Pass Canal to Lake Gordon for power generation at the Gordon Power Station. The dam has no spillway. Flood waters are discharged either to Lake Gordon or through an outlet at Serpentine Dam. Riparian water can be released down the Huon River from an outlet at Edgar Dam.

Because Lake Pedder is located in a very scenic region, the lake level is normally maintained within a range of 1.5 m to minimise the exposure of mudflats on gently sloping shores. In addition the storage has been cleared of timber which would have died and been visible from the road. Wherever possible construction scars were avoided or have been restored and revegetated.



Scotts Peak Dam - Cross Section

Repair in 1975-76

The dam is not quite in its original condition. As soon as the reservoir filled, cracks developed in the upstream face membrane just above the gravel zone, and leakage emerged at the downstream toe of the dam. The cracks were attributed to the higher compressibility of the argillite rockfill relative to the gravel zone, causing tension cracks in the bituminous concrete which loses its ductility at low temperatures.

The cracks were temporarily sealed by covering them with rubber sheets placed by divers. The permanent treatment of the cracks presented a significant technical problem, because the cracks were 30 m below the lake surface and the value of the stored water in the huge lake dictated that the job be done without lowering the water level.

The design solution was to cover the lower half of the dam face with an impervious blanket of well-graded silty gravel which would also fill and seal the cracks. For stability, the gravel had to be placed in horizontal layers from abutment to abutment, starting at foundation level. To avoid segregation, the material had to be placed close to its final position; dumping from the lake surface was not acceptable.

The construction method was to ferry the gravel in a large bottom-opening bucket on a barge. On each trip, the bucket barge travelled from the shore to a docking barge already anchored over the next dumping point. Surveyors on the shore ensured accurate positioning. The bucket was lowered through the water and the load was released a metre above the dam face. The shape and thickness of the rising

blanket were monitored by sonar traverses using a small boat in calm weather. A full description is presented in References 7 and 9.

Condition and Integrity

Since the gravel placing was completed in 1976, regular monitoring and inspection of dam has shown its performance to be completely stable and entirely satisfactory. No further work has been required. The dam is well-maintained and in good condition. The gravel blanket is hidden under water.

Prominent associated persons

As indicated above the owner of Scotts Peak Dam is the Hydro Electric Corporation of Tasmania, which is a Government Business Enterprise. The dam was investigated, designed and constructed by the human and physical resources of the then Hydro-Electric Commission. At that time the Commissioner, Sir Allan Knight, was both chairman and chief executive of the organisation. Those responsible for the work at each phase were:

Investigation	**Design**	**Construction**
Russell Ashton	John Wilkins	Ian Tulloch
Henry McFie	Bill Mitchell	Guy Ward
Tom Suttar	Jack Fidler	Ted Hofto
Gordon Hale	Bruce Cole	Gordon Gregory
Jim Park		
John Linton		

2.5 Illustrations

The illustrations include pictures of the three dams and the canal:

5.1 Scotts Peak Dam, a 43 m high rockfill dam 1067 m long, with an upstream face of bituminous concrete.

5.2 Edgar Dam, a 17 m high earthfill dam 460 m long, with concrete slab wave protection.

5.3 Serpentine Dam, a 38 m high concrete-faced rockfill dam, 131 m long. Its gated outlet has a capacity of 240 m^3/s.

5.4 McPartlan Pass Canal, 2.75 km long, conveys water from Lake Pedder to Lake Gordon.

3. STATEMENTS OF SIGNIFICANCE

National Estate Significance is claimed under seven criteria, namely A3, A4, B2, E1, F1, G1, and H1. Each of the criteria is addressed below.

Criterion A3: *Importance in exhibiting unusual richness or diversity of landscapes or cultural features.*

The dam and Lake Pedder are located in a spectacular region of south-west Tasmania. The landscape consists of

- the highest mountain in the South-West (Mt Anne, 1350 m)
- jagged mountain ranges with numerous quartzite or dolerite peaks (the Frankland Range and the Mt Anne Range)
- a very large lake, cleared of trees which would have died after inundation and been visible from popular viewing points
- button grass plains
- forested slopes and creek lines
- the effects of centuries of wild fires
- streams carrying dark coloured (button grass) water
- careful construction of the project and restoration of disturbed areas, to minimise permanent visual scars.

The Frankland Range provides a very attractive backdrop for the lake, especially in calm sunny weather when the reflections of the mountains can be seen in the lake surface.

The high rainfall and cool temperatures favour rain forests and dense plant growth where there is suitable nutrition. In the high rainfall areas the steeper slopes lose most of the plant nutrients following fire. Pockets of thick rainforest remain on southern and eastern slopes which are seldom burnt, whereas the northern and western slopes carry denuded sedgeland and button grass and heath. The high rainfall also favours the development of peat forming communities in infertile regions. Button grass thrives in the peaty acidic soils of the wide flat plains; each plant consists of a browny green clump sprouting a few long reeds each ending in a black knob or button.

The following description of the flora around Lake Pedder is taken from Brown, 1955: "Lovely and diverse flora blooms on the extensive button grass plains, wooded hills and the rocky peaks. From November to the end of January, the plains are a kaleidoscope of colour: the delicate pink of swamp heath, cream and mauve melaleuca, the guinea gold of ground-hugging hibbertias, pale blue iris, the flamboyant scarlet and orange-hued blandfordia lily, and over all a pungent perfume which recalls the South-West so vividly to all walkers, the lemon-scented thyme, a species of boronia."

Lake Pedder is popular with anglers and is renowned for its large trout.

Criterion A4: *Importance for association with landmark events, developments or stages in Australian history or in the history of a State, region or community.*

Scotts Peak Dam is associated with the first permanent European occupation of this inland region of Tasmania. The village of Strathgordon was built for the construction of the Gordon River Power Development. At its peak the willage had 270 houses and a population of 2000. Married staff who worked on Scotts Peak and Edgar Dams travelled daily from Strathgordon. (The single men were housed in a temporary camp on site.) The project was completed in 1978 but a small population continues to live at Strathgordon.

The availability of low-cost hydro-electric power and the security of large storages influenced a significant phase in the economic development of the state.

The approval by the Tasmanian parliament and the construction of the project were the prologue to a debate which led to

- the beginning of an organised conservation movement in Tasmania,
- a significant change in federal-state relationships with regard to land use and the control and development of natural resources, and
- the cancellation of a subsequent hydro-electric power development on the Gordon River.

Details of these matters are set out in the Historical Summary.

A considerable number of articles, papers and books have been published on a wide range of issues associated with the Gordon River Power Development Stage 1.

Criterion B2: *Importance in demonstrating a distinctive way of life, land use, function, or design no longer practised, in danger of being lost, or of exceptional interest.*

There are only two rockfill dams with bituminous concrete faces listed in the ANCOLD Register of Large Dams in Australia (Reference 1). Both were designed and built by the Hydro-Electric Commission. One is the 14 m high Mackenzie Dam in north-west Tasmania, completed in 1972. The other is Scotts Peak Dam, completed the next year.

The decision to adopt a bituminous concrete face was made because the dam with that facing showed a significant cost saving over the other alternatives considered (Reference 7). Techniques of designing, producing, testing and placing waterproof flexible bituminous concrete were not readily available in Australia, and an overseas study tour was made to research this technology. There are many small reservoirs lined with this material in Europe.

As mentioned in the Technical Description, a series of cracks occurred in the bituminous concrete face when the lake filled and some leakage was observed at the downstream toe. Remedial work has been quite successful. The cause of the cracking was fully investigated and reported in technical papers published both in Australia and overseas (References 3, 7 and 9). The cracks were attributed to a discontinuity in the support for the face membrane by two different materials used in the embankment. The lower part of the face was supported on a relatively rigid zone of compacted gravels, while the remainder rested on compacted rockfill. A dam cross section is presented in the Technical Description. The argillite rockfill proved to be a softer material which allowed some depression of the face under water pressure from the reservoir. Tensions then developed in the face membrane near the discontinuity in support, and cracks developed progressively to relieve the tensile stresses. Bituminous concrete loses some of its ductility at cold temperatures.

It seems likely that the Scotts Peak example has not been followed elsewhere in Australia because of the face cracking and leakage which occurred.

Distinctive way of life.

The work force which built Scotts Peak Dam was housed in a temporary singlemens camp on site. These men worked on a succession of power schemes and moved from camp to camp as each project finished and the next began. They developed their special skills and carried them on to the next scheme. In the camps, each man had his own room, ate in the dining room and drank in the bar. There were some recreational facilities and television was usually beamed in from a repeater station. At weekends most men went to their families or to one of the larger towns but, for some, the camps were their homes.

Some camps were located in HEC villages where married staff were accommodated in houses and the facilities included a school, church, post office, bank, swimming pool and squash courts. Members of some families worked for the Commission for more than a generation.

Land use

Lake Pedder demonstrates a distinctive land use. Not only does the lake occupy a large area (241 sq km) but the lake level was raised until the water could flow out of the Serpentine-Huon catchment into the Gordon River catchment over a natural saddle (McPartlans Pass) under gravity. This arrangement avoided the need for a tunnel or a pumping scheme. It was only necessary to build a surface canal with a gate structure at its entrance to regulate the flow. In addition the harmony between the lake and its scenic surroundings was enhanced by removing trees from the storage and limiting the fluctuations in water level to 1.5 m.

Criterion E1: *Importance for a community for aesthetic characteristics held in high esteem or otherwise valued by the community.*

The new Lake Pedder is highly valued by the community

- for the beauty of the lake and its scenic surroundings,
- for providing road access into a very beautiful and rugged part of Tasmania,
- for providing road access to walking tracks to: Mt Anne and the Anne Circuit, the Western Arthur Range (40 peaks and 30 lakes), the Eastern Arthur Range including Federation Peak, Port Davey and a round trip to Geeveston,
- for providing access to untracked wilderness areas in south-west Tasmania, and
- for its excellent fishing.

Each year about 40 000 visitors drive along the Gordon River and Scotts Peak roads. Both roads provide excellent views of Lake Pedder and its surroundings.

Criterion F1: Technical excellence, innovation or achievement.

The treatment of the cracks in the dam face to stop the leakage presented a significant technical problem. The cracks were 30 m below the lake surface and the huge area of Lake Pedder (241 sq km) dictated that the job be done without lowering the water level.

The design solution was to cover the lower half of the dam face with an impervious blanket of well-graded silty gravel which would also fill and seal the cracks. For stability, the gravel had to be placed in horizontal layers from abutment to abutment, starting at foundation level. To avoid segregation, the material had to be placed close to its final position; dumping from the lake surface was not acceptable.

The construction method was to carry the gravel in a large bottom-opening bucket, to lower the bucket through the water and to release the load a metre above the dam face. On each trip, the bucket barge travelled from the shore to a docking barge anchored over the next dumping point, employing surveyors on the shore to ensure accurate positioning. The shape and thickness of the rising blanket were monitored by sonar traverses using a small boat in calm weather. A full description is presented in References 7 and 9.

Excellence was demonstrated in every aspect of the task: developing the concept, proving its feasibility through model testing, making the specialised equipment, carrying out the job and proving its success.

Criterion G1: *Importance as a place highly valued by a community for reasons of symbolic, cultural or social associations.*

The controversy over the flooding of Lake Pedder in 1973 has been mentioned under Criterion A4. That debate is a celebrated case history in any discussion on the legal safeguards for national parks and on the way environmental issues are to be resolved. The new Lake Pedder is a symbol of a great environmental battle lost.

The Lake Pedder case undoubtedly provided strong motivation for the 1983 Lower Gordon Dam battle not to end up the same way. That debate was finally resolved in an extraordinary manner by the federal government invoking its External Affairs powers to overturn the decision made by the State government.

Criterion H1: *Importance for close associations with individuals whose activities have been significant within the history of the nation, State or region.*

The Hydro-Electric Commission, Tasmania

As mentioned in the Historical Summary, Scotts Peak Dam was designed and constructed by the Hydro-Electric Commission, Tasmania (HEC). The development of the hydro-electric resources of Tasmania began in 1911 with the construction of the Waddamana Scheme which was started by the Hydro-Electric Power and Metallurgical Company and finshed by the Tasmanian Government Hydro-Electric Department. In 1930 that department became a Commission which carried out an unbroken series of power schemes for 64 years, until the last hydro-electric power development (the Anthony Scheme) was finished in 1994. The Commission was a major source of continuous employment and the cheap power it produced attracted many industries to the State. Its engineers were encouraged to try new techniques and ideas and there were many innovations along the way. The fact that the HEC was prepared to try something new for Australia (i.e. a dam with a bituminous concrete face) was typical of an organisation which was renowned for its progressive approach.

The Commission not only designed and constructed power schemes; it was responsible for operation, maintenance, distribution and sales, both to major industries and retail customers. Now a Corporation, it has been and still is a very important Government Business Enterprise in Tasmania.

Association with Individuals

Being an essential component of the new Lake Pedder, Scotts Peak Dam has a strong association with *Mr Eric Reece*, Premier of Tasmania and *Sir Allan Knight*, Commissioner of the Hydro-Electric Commission.

Mr Reece was Premier for 14 years (1958-69 and 1972-75). He stood up to the full brunt of the "Save Lake Pedder" campaign over many years and never wavered in his determination to see the project through to a successful completion.

Sir Allan Knight obtained Parliamentary Approval for the Gordon River Power Development Stage 1 of which the formation of Lake Pedder was a vital part. Sir Allan was Commissioner and Chief Executive for over 30 years (1946-77), a period of very rapid hydro-electric development in Tasmania.

United Tasmania Group (UTG) and Dr Richard Jones

This political party was formed at a Lake Pedder protest meeting in Hobart in March 1972. Its foundation document was the first affirmation world-wide of a conservationist political agenda. It strongly opposed the whole development ethics of the State. It stood candidates in the 1972 State

election at short notice without success. (However both the major parties quickly came up with environmental policies after the election and the new Department of Environmental Control was established.) The co-directors of the UTG were *Dr Richard Jones* and Mr Milo Dunphy. Dr Jones was the Foundation Director of the Centre for Environmental Studies at the University of Tasmania. He proved to be politically astute and a strong leader. The UTG was wound up when its supporters began to put their energies into the Wilderness Society which began in 1976. (Reference 9)

Hydro

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Telephone (03) 6237 3400
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Our Ref.
Your Ref.
Ask for

24 February 2000

Mr K C Drewitt
Chairman
Engineering Heritage Committee
The Institute of Engineers
2 Davey Street
Hobart Tas 7000

Dear Mr. Drewitt,

Thank you for your correspondence of 14 February 2000, advising of the eight dams which have recently been nominated for national heritage listing on the National Estate Register.

The Hydro is very pleased to approve the nominations and we look forward to hearing the outcome of the proposed public recognition awards.

With kind regards,

Yours sincerely,

Roger Gill
Generation Manager Generation

c.c. Andrew Pattle, Dam Safety Manager
Peter Grierson, Manager Power Schemes

Scotts Peak Dam and Lake Peddar

SCOTTS PEAK DAM

AUSTRALIA

TYPE: Bituminous concrete faced rockfill
HEIGHT: 43 m CREST LENGTH: 1067 m
EMBANKMENT VOLUME: 550 000 m^3
STORAGE VOLUME: 2960 million m^3
COMPLETED: 1973
OWNER: Hydro-Electric Commission of Tasmania

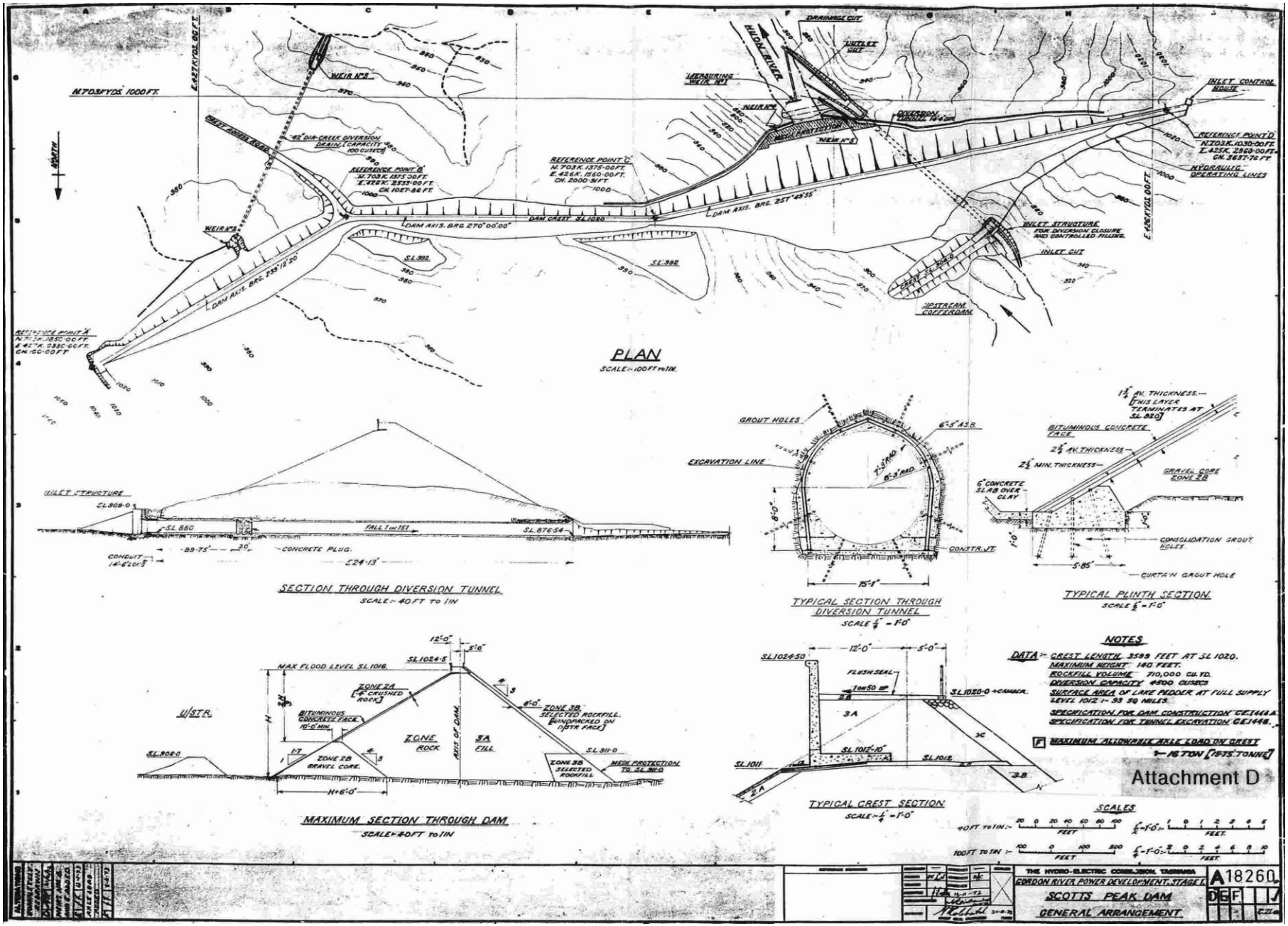
Scotts Peak Dam, on the Huon River in south-west Tasmania, is the largest of the three dams containing Lake Pedder, part of the Gordon River Power Development. It is a rockfill dam with a bituminous concrete face, and it follows a zig-zag alignment with the upstream face in three planes. It is topped with a 4 m high concrete wave wall. The upstream face slope is 1:1.7, somewhat less steep than usual to facilitate rolling of the bituminous concrete face, and the downstream face slope is 1:1.3.

Because the foundation rock is prone to cracking or softening on exposure to water, the region of high hydraulic gradient around the plinth has been overlaid with a blanket of impervious natural gravel to extend the seepage path. Leakage is measured at three weirs downstream of the dam, and it is generally very slight, about 3 l/s.

Services Provided

Feasibility study, investigations,detailed design, documentation, supervision of construction, operation and maintenance.

HEC



Attachment D